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Game Theory and Trade Tensions between Advanced Economies

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Gholamreza Askari[1], Madjid Eshaghi Gordji[2], Somayeh Shabani[3], José António Filipe[4]

Abstract:

Purpose: *This article aims to study trade tensions between advanced economies and to express the difference between "currency war" and "trade war" and the respective effects on the global economy.*
Design/Methodology/Approach*: The analysis of trade relations between countries is always one of the main concerns of policymakers and economists. In this paper, interactions Dollar-Yuan, Yuan-Euro and Dollar-Euro are modeled using game theory, being the effect of protectionism and currency devaluation in trade tensions studied by introducing a new game defined as threat game.*
Findings: *Our findings show that protectionism and negotiation strategy is a credible deterrent threat and can be a brake for a total currency war. Also, we use the concept of rational choice to demonstrate that, for advanced economies, the cooperation strategy is the best way to overcome the Covid-19 pandemic crisis.*
Practical Implications: *The subject discussed in the paper refers to issues related to protectionism, currency war and negotiation. The holistic perspective that is applied in this study includes the expression of a dominant strategy in trade relations between countries that helps to prevent the competitive devaluation of money. The consequences of the currency war have been catastrophic for the global economy and have ultimately led to a global depression. It also outlines ways to converge in overcoming the COVID-19 pandemic.*
Originality/Value: *This paper focuses on the prospects for trade relations between advanced economies such as the United States, Europe and China. As a result, the perspective proposed allows us to make a significant and innovative contribution to the literature because it can equip relevant stakeholders in the Global Economic System with the necessary strategies to make efficient decisions.*

Keywords: *Game theory, currency war, protectionism, trade war, coronavirus pandemic.*
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Paper Type: *Research study.*

[1]*Department of Mathematics, Semnan University, Semnan, Iran; g.askari@semnan.ac.ir;*
[2]*Same as in 1, E-mail: meshaghi@semnan.ac.ir;*
[3]*Same as in 1, E-mail: shaabani.somaye@semnan.ac.ir;*
[4]*Corresponding author, Department of Mathematics, Iscte –Instituto Universitário de Lisboa, Information Sciences, Technologies and Architecture Research Center (ISTAR-IUL), Business Research Unit-IUL (BRU-IUL), Portugal, E-mail: jose.filipe@iscte.pt;*

1. Introduction

In the 20th century, two huge currency wars had very significant impacts on economies worldwide. The term currency war is referred to represent the situation in which countries seek to increase their exports, to create employments at the expense of their trade partners and to gain market share through the competitive reduction of the national currency value (Rickards, 2012). When factors as consumption, governmental expenses, or investment are not able to create economic growth in the country, it may be necessary to make the currency cheaper as the fastest way to achieve the exports increase, leading then to economic growth as the last bargaining chip in trade competition (Cohen, 2018). Historically, there are some important cases of currency wars. It is the case of the one that started when Germany devalued its currency in 1921, or the example of another one when Great Britain devaluated its currency in 1967, or yet the one occurred when the USA devalued their currency in the 2008's financial crisis (Guillaumin, 2017; Włodarczyk, 2014). In accordance, beggar-thy-neighbor policies adopted by central banks of economies under recession work as contributors to the collapse of global trade (Pera, 2018).

In today's world, currencies are not only used as an economic tool; a currency is often converted into a super-strategic weapon that allows the aggressor to take secret actions that are significantly destructive. Considering the country's strategic goals and benefits, a financial war may be launched as a weapon to force economic and political competitors to move out. By using such threatening strategy, a country intends to provoke relevant damages on competitors (Forrest *et al.,* 2017).

The threatening issue concerns to a situation for which the opposite party is conducted to use a specified strategy. This situation has been recognized since a long time ago in the military literature and in international relations. The selection of such specific strategy by the opposite party sometimes is called deterrence issue (Paul *et al.,* 2009). Deterrence is generally defined as the unilateral use of a set of threats to persuade another party to not perform an undesirable act. Thomas Schelling deepened the understanding of this issue by introducing the credible and non-credible concepts (Schelling, 1966; Schelling, 1980). The credibility of a threat exists as a real threat when the opponent party believes that the opposite one possesses such ability (Bolt and Houba, 2006; Zegart, 2020). In other words, the reasonability of a threat is the requisite for its credibility (Antoniou, 2020; Blanchard, 2016). Commitment and threat are important issues in game theory: commitment is a useful promise for the opposite party; by its turn the threat is a harmful promise for the opposite party (Sun and Sun, 2018).

The purpose of this paper is to investigate trade tensions between advanced economies, by raising first some questions and getting then the answers to them, involving the field of trade relations between countries. The following questions may be posed what is the difference between the trade tension and the currency war? which one of them is better, the trade tension or the currency war? For answering

these questions, it is necessary to determine, to some extent, the global economic path on this. Besides, there is yet another interesting question to be raised, that may be posed as: how can a country pull the brake of the currency war to prevent economic depression in the global economy?

In this article, we seek to answer these questions. We introduce a new game to model the trade tension between the USA and China. This new game is named threat game or currency war game. The new game is a type of generation of the chicken game. By using the new game, threats are divided into three categories. The first category includes non-credible threats. The second includes credible-deterrent threats to deter and prevent struggles in which a player threatens the opponents to select a strategy to warn the opponent, and the opponent believes that he possesses such ability. The third category includes a strictly-credible threat aiming to destroy the opponent, being the player highly motivated to put the threat into action even if the situation results in a struggle.

The paper is structured as follows. In the next section we present the game theory issue in the current situation and the credible threats. we introduce the threat game/currency war game. In the section 3, we model the currency war games, specifically the Dollar-Yuan, the Yuan-Euro and the Dollar-Euro games using the game theory. In the section 4, we focus on the impact of the coronavirus pandemic on the global economy and on the international community, using the tools in this area. The last section is left to the discussion and conclusion.

2. Game Theory and Credible Threats

Game theory provides suitable models and tools to decision-makers who interact with the objective of maximizing their own benefits (Eshaghi Gordji and Askari, 2018; Mailath, 2019). The chicken game, also called hawk–dove game or snowdrift game, is one of the known games highly applied for modeling rational agents and irrational agents' behavior (Eshaghi Gordji and Askari, 2018; Krstić and Krstić, 2016; Liu *et al.*, 2019). The chicken game G_1 is shown in Table 1**.**

Table 1. *Chicken game* G_1

Player 1	Player 2	
	C	D
C	0, 0	-2, 2
D	2, -2	-6, -6

Note: ***C****= Cooperate;* ***D****= Non-cooperate.*
Source: *Own study.*

The chicken game is a symmetric game, having two equilibriums with pure strategies. According to many theorists, it is difficult to reach the chicken game equilibriums under real conditions. However, most theorists mention that the final

result of many crises is a compromise, in which none of the players withdraw from the direct route with the help of the steering wheel; and additionally they are not losers, what is similar to pulling the brake. This fact leads us to introduce a new game or a sort of generalization of the chicken game, which is highly capable of providing the analysis of the events, which flows based on credible and non-credible threats, despite its simplicity.

2.1 Threat Game or Currency War Game

Imagine two drivers who drive towards each other. Let's consider the following situations: 1. the driver does not use the brake on the route and uses the only steering wheel to swerve ($\boldsymbol{S}$); 2. The driver does not use the steering wheel on the route and uses the only brake to pull up on the route ($\boldsymbol{B}$); 3. The driver does not use the steering wheel and brake on the route and only go straight ($\boldsymbol{SB}$). Each driver has three selected options: he/she can continue going straight ($\boldsymbol{SB}$), pull the brake ($\boldsymbol{B}$), or swerve ($\boldsymbol{S}$). The player who selects $\boldsymbol{S}$ is named "chicken" and will swerve; what is the non-credible strategy. The player who selects $\boldsymbol{B}$ will pull the brake; it is a credible-deterrent strategy. The player who selects $\boldsymbol{SB}$ will continue going straight; as a result, it is a strictly-credible strategy. We show the threat game $\boldsymbol{G_2}$ in Table 2.

Table 2. *Threat game or Currency war game* G_2

Player 1	Player 2		
	S	B	SB
S	0, 0	-3, 3	-2, 2
B	3, -3	1, 1	-3, -5
SB	2, -2	-5, -3	-6, -6

Note: ***S****=Steering wheel;* ***B****=Brake;* ***SB****=Steering Wheel-Brake*
Source: *Own study.*

The threat game is a symmetric game. In this game, strategy $\boldsymbol{B}$ is the strictly dominant strategy over the strategy $\boldsymbol{SB}$ for both players. Therefore, the strategy $\boldsymbol{SB}$ is strictly dominated and can be eliminated. By comparing the remaining strategies, we notice that strategy $\boldsymbol{B}$ is the strictly dominant strategy over strategy $\boldsymbol{S}$ for both players. As a result, strategy $\boldsymbol{S}$ can also be eliminated. Therefore, the game equilibrium $(\boldsymbol{B},\boldsymbol{B})$ will be got, using the consecutive elimination of the strictly dominated strategies.

In the chicken game, it is assumed that each player prefers to win and if she/he is not able to get it, she/he intends to get a compromise, although there will not be a compromising point on the game equilibrium options. In the threat game, while the

brake preserves the probability of collision, it is regarded as a deterrent threat. If both players select the brake which is the game equilibrium, it can be said that they have selected exactly the compromising point. As the game is symmetric, it is sufficient to interpret the game table cells for *row* players. Cell (S,S) represents a situation in which both players swerve the straight route before collision by turning the steering wheel and are called chickens. This cell of Table 2 is similar to the cell (C,C) of Table 1. In other words, the selection of steering wheel strategy by each player is a non-credible threat and the opponent knows that she/he will pull over. The cell (B,S) means that the *row* player pulls the brake and keeps the straight line but the *column* player exits the straight route. In other words, the strategy B can be called a credible-deterrent threat because the *row* player, by selecting this threat, made the opponent to pull over. Consequently, the *row* player is a winner.

The cell (SB,S) means that the *row* player continues the straight route and does not exit while the column player exits the straight line. This cell of Table **2** is the one similar to cell (D,C) of Table 1. The strategy SB can be called a strictly-credible threat, once the *row* player caused the opponent to swerve and he won by selecting this threat. The difference between credible-deterrent and the strictly-credible threat for the selecting player is on the type of loss that makes a threat to seem more credible. By its turn, the loss of a credible-deterrent threat is lower than the one of a strictly-credible threat. Cell (SB,B) states that the *row* player continues the straight line and does not withdraw, but the *column* player pulls the brake and does not exit the straight line in which the two players will collide with each other. In this situation, by considering this collision, none of the players is called chicken or winner, differing the harm of collision for both players, based on the strategy's selection type. In other words, the outcome that results from selecting a strictly-credible threat *versus* a credible-deterrent threat is measured in the basis of the loss because there was a collision. As mentioned above, the executive loss of the strictly-credible threat is higher than that of the credible-deterrent threat. As a result, the outcome of the strictly-credible threat is lower than that of the credible-deterrent threat.

Cell (SB,SB) states that both players continue the straight line and no one withdraw. In this case, the two players will collide with each other. With this collision, no one of the players is called "chicken" or winner and the loss of the collision will be the same for both players. This cell of Table 2 is similar to the cell (D,D) of Table 1. Cell (B,B) states that both players pull the brake and remain in the straight line and don't exit. In this case the two players will not collide with each other. In this cell, no one of the players is called "chicken" or winner. No collision has occurred. For this reason, there is a rational response for both players. In other words, the selection of a credible-deterrent threat strategy by both players

will prevent the collision and the struggle. Also, a strictly dominant credible-deterrent threat strategy is preferred over the strictly-credible threat for both players. As a result, it can be said that selecting the credible-deterrent threat by each player will lead to an equilibrium in the game.

3. Currency Wars

In the 21th century, two new currencies emerged- the Chinese Yuan and the Eurozone's Euro - to gradually challenge the hegemony of the system's installed dollar. Many regard these two foreign currencies as very important international currencies in the future. The main actors of the new currency war are the Dollar, the Yuan and the Euro, which are issued by three big world economic players: the USA, China and the European Union, respectively. The scientific research for studying games involving these three global super currencies is very important once the countries' economic prosperity is highly dependent on the mutual relations of these foreign currencies. In this section, we use game theory to model the interaction between Dollar and Yuan, Dollar and Euro and Yuan and Euro.

3.1 Dollar-Yuan Game

Since China joined the World Trade Organization (WTO), the trade between China and other countries has considerably increased. China has the second biggest economy in the world and is the leader in terms of the global exports, what made Yuan becoming an important and attractive currency for investors (Bui, 2019). Currently, the Beijing's strategy for trading with other countries is making transactions using the Yuan. Subramanian (2011, pg. 34) assuredly predicts that "the possibility of increasing the economic dominance in China is converted into foreign currency dominance"; and before the middle of the next decade, Yuan can surpass the Dollar as the dominant foreign exchange rate (Cohen, 2018). The war between Dollar and Yuan is the central core of today's financial affairs in the world and one of the frontlines of the new currency war (Rickards, 2012). Donald Trump, the USA president, for the first time in the trade history of the USA, defined the USA trade policies as a player supporting aggressively the USA national security policy (Malawer, 2019). It is possible to refer, for example, the 2018's decision of the president Trump for applying tariffs of up to 25 percent to the Chinese imported goods worth USD 250 billion (Fuchs *et al.*, 2019).

We model Dollar-Yuan game using the threat game/currency war game. In this game, Dollar (USA) is considered as the *row* player and Yuan (China) is taken as the *column* player. The *row* player has three actions: accusing China of manipulating currency and calling China currency manipulator ($\boldsymbol{S}$), protectionism (trade limitations and putting a tariff) and negotiation ($\boldsymbol{B}$), devaluation of currency ($\boldsymbol{SB}$). The *column* player has three actions: accusing the US of unilateralism ($\boldsymbol{S}$),

protectionism (trade limitations and putting tariff) and negotiation ($\boldsymbol{B}$), devaluation of currency ($\boldsymbol{SB}$). We show the game Dollar-Yuan in Table 3.

Table 3. *The game Dollar-Yuan* $\boldsymbol{G_3}$

	Player 2		
Player 1	S	B	SB
S	0, 0	-3, 3	-2, 2
B	3, -3	1, 1	-3, -5
SB	2, -2	-5, -3	-6, -6

Note: ***S****=Currency manipulator or unilateralism;* ***B****=Protectionism and negotiation;* ***SB****=Devaluation of currency*
Source: *Own study.*

In trade tension between America and China, the main accusation which is made by the USA against China is that China manipulates its foreign exchange rate to keep the exports cheap for foreign buyers. For example, in January 1994, China devalued its currency, the Yuan, and the USA threatened China to call it *currency manipulator,* based on the Commercial Code of 1988 (Rickards, 2012). In 2018, Donald Trump accused China of manipulating the exchange rate, having China responded to the USA's request to reinforce Yuan. By its turn, China accused the USA of manipulating its currency unilaterally. Chen Deming, Former Minister of Commerce of China, accused the USA of reckless money-printing because American Dollar releases were out of control, increasing the price of international goods; the inflation imported invaded China (Cao, 2016). The inflation which had been created by USD printing caused a tsunami of capital flow toward China markets by combining the commercial surplus and the hot monies, causing also inflation in other countries. When looking retrospectively, we notice that the USA unilaterally announced its new economic policy in 1971, leading to the devaluation of Dollar. As a result, the accusation strategy is a non-credible threat and both players did not believe this threat and so, they would not take a step to reinforce their currency. Therefore, it can be said that both countries remain in the cell $(\boldsymbol{S},\boldsymbol{S})$ of the game table by selecting the accusation strategy $\boldsymbol{S}$.

In the global economy, protectionism and negotiation $(\boldsymbol{B})$ is a tool that helps manufacturers of each country. This tool includes putting tariffs over imported goods, for controlling the inflow and outflow of capital and other barriers to free trade (Dadush and Eidelman, 2011; Eichengreen, 2013). Therefore, protectionism is considered a deterrent credible threat that remarkably benefits a country due to the support that this strategy gives to its domestic products. The high cost of exports of a country leads to a reduction on its production, to an increase in unemployment and a loss of foreign markets. Because the exports are more expensive for the American consumers and Chinese markets become smaller in the USA. As result, players are placed in cells $(\boldsymbol{B},\boldsymbol{S})$ or $(\boldsymbol{S},\boldsymbol{B})$.

Another strategy in the currency war between the two countries is currency devaluation $(\boldsymbol{SB})$. Currency devaluation is possible through inflation, money printing, quantitative easing and interest rates lowering. Quantitative easing is a type of unsupported money printing which was first applied by the USA. The printed Dollars downhill toward China from the balance of trade increasing route resulting from Chinese exports to the USA and through hot money flow to find the profits more than what is accessible in the USA (Rickards, 2012). Beijing imports inflation from the USA by printing Yuan and through the fixed Dollar-Yuan exchange rate. By increasing the Yuan value above inflation, Chinese export costs will increase and make the USA stronger to compete with China. Dollar printing also means the devaluation of the USA debts to foreign creditors such as China and means that they will recover their debts at the cheaper Dollar. As a result, selecting the non-credible threat strategy $\boldsymbol{S}$ by China against strategy $\boldsymbol{SB}$ by the USA is expensive for China, which is the same as Cell $(\boldsymbol{SB},\boldsymbol{S})$ of the game at Table 3.

China can compensate for a situation at which the dollar devaluation benefits with tariffs. This is as much as the devaluated Dollar currency using the protectionism tools $\boldsymbol{B}$ and remove the benefits resulting from Dollar devaluation in the Chinese market. China can retaliate for such action of the USA by putting a tariff on American crops such as soybean, cotton and gold (Fuchs, et al., 2019). One of the other effects of selecting the protectionism strategy by China is to reduce the Chinese investment rate in the USA, preferring the Chinese to invest in the local market over the foreign market. Direct investment of China in the USA in 2018 has been the only USD 8.4 billion, after having decreased from USD 29 billion in 2017 and USD 46 billion in 2016 (Goulard, 2020). China can prevent the devaluation of the currency reserves by diversifying cash reserves, i.e. China can buy bonds in Yen, Euro and pound sterling, which have been exported by countries and banks outside the USA. Therefore, China can greatly prevent losses resulting from Dollar devaluation to a great extent; that is, the two players are placed in the cell $(\boldsymbol{SB},\boldsymbol{B})$.

In March 2018, the USA put custom tariffs of up to 25 percent for the imported steel and 10 percent for the imported aluminum and other Chinese goods (Özer, 2020). These goods included electronic parts, clothes, scientific and laboratory equipment. One of the other important actions of the USA in this trade tension was to sanction Huawei Technologies Co. By its turn, as mentioned above, China rapidly retaliated this action by putting tariffs and controlling the inflow and outflow of capital. This practically was the beginning of the trade tension between China and the USA and, since then, different tariffs have been imposed by both parties to the opposite party's goods. There are also some trade negotiations between the economic leaders of China and the USA, which news affect markets. This trade war has no winner. In December 2019, these two countries reached an agreement, approving to avoid their

previous plans that aimed to increase more importation tariffs on each other's products, increasing now China the American crop rate and energy for the first phase of this trade agreement. The USA has been also obliged to reduce the tariff on the importation of goods at a value of 120 billion from China from 15 to 5.7 (Berthou and Stumpner, 2020; Wong et al., 2020). It can be consequently said that selecting the protectionism and negotiation strategy by players is the solution for exiting the hard condition of the Threat game that is $(\boldsymbol{B},\boldsymbol{B})$ the game Nash Equilibrium.

If china selects the strategy $\boldsymbol{SB}$, the USA can retaliate using the protectionism tools as mentioned above (Mauldin, 2019). Studies conducted by Bloomberg show that in 2019, the USA economy got a damage of USD 134 billion, due to the trade tension between the USA and China, reaching such damage likely USD 316 billion by the end of the following year, what is equivalent to from 3.0 to 7.0 percent of the USA total GDP (Hartmann and Issing, 2002). It can be said that selecting the strategy $\boldsymbol{B}$ by the USA against Chinese money devaluation is expensive for the American economy and players are placed in a cell $(\boldsymbol{B},\boldsymbol{SB})$.

If the USA devaluates the dollar currency through inflation, Chinese currency reserves will be devalued in terms of the US Dollar debts. On the contrary, by its turn, China can sell the USA treasury bonds all at once. Considering supply and demand law that governs the bonds market, increasing supply in this market causes a decrease on its price, what makes that a large amount of the damage resulting from such reduction will return to China itself (Rickards, 2012). The national security of the USA is largely dependent on the dollar. If the dollar is devalued, the national security will collapse concurrently. As a result of selecting the strategy $\boldsymbol{SB}$ by the two players, the worst possible result in this currency war game is the cell $(\boldsymbol{SB},\boldsymbol{SB})$ on the game's table.

Our findings show that protectionism is a dominant strategy and is a credible-deterrent threat, which prevents the competitive devaluation of money. China seeks to reinforce its currency to make it known as an important currency in international trade. The USA seeks to recover the lost trust in the dollar and wants to place the dollar on the top of international exchanges. This model shows that protectionism ends in the trade war and currency devaluation ends in the currency war. The protectionism can be a brake for preventing the catastrophic consequences of the currency war.

There are many reasons that most countries use protectionism tools in the future instead of currency evaluation and turn to the trade war. First, the trade war will occur between the two countries, which can be controlled and does not involve the whole global economy. Second, protectionism tools are taken into account for the individual (national) interests on the way of development and are less expensive for

the individual and the global economy. However, tools for the competitive devaluation of money are considered as taking step in the ambiguous direction with mirage-like perspective; the worst result will be economic recession. Third, the global monetary system and the currency reserves will tend to be multipolar, what is a strong reason for beginning trade wars between countries. Fourth, since some countries benefit from trade wars between countries, the probability of trade war spreading is low, such as in Vietnam and the Eurozone affected by the Washington-Beijing trade. Although the current trade war between the USA and China has caused dissatisfaction among both parties, and a trade agreement can return trust and confidence between Washington and Beijing.

3.2 Yuan-Euro Game

Euro, as the European currency, was born in 1999, for which a good future had been predicted. Robert A. Mundell stated that "Euro will undoubtedly challenge the dollar condition and change the configuration of the system power" (Mundell, 2000; pg. 27). The economic growth of the Eurozone was remarkable before the financial crisis of 2008, but such a crisis took economists to be doubtful about the economic resilience of the Eurozone. Such a crisis caused fragility of the Eurozone and considering the China's good condition and strong position, this country made use of such opportunity and cooperated with Europe.

China got closer to this union by purchasing some of the foreign debts of the members of the Eurozone. A strong euro contributed to the diversification of the position of the Chinese currency reserve to replace Dollar with more Euro (Foo, 2019). Beijing also sought to get access to sensitive European technologies and bought advanced military systems by making a direct investment in Europe. Such cooperation made the European Union to turn into one of the largest trade partners of China. It can then be said that the game between Yuan-Euro is the Stag hunt game G_4 in Table 4.

In the game between China and the Eurozone, both players prefer cooperation C to non-cooperation D. The trade tension between the USA and China also caused challenges as well as opportunities for the European countries. The European Union suffered from a severe trade deficit against China as well as a potential violation of the intellectual property rights by Chinese companies. Several economic sections such as properties and real estate, tourism, or education had very limited economic growth due to the trade war between the USA and China. As a result, cooperation led to more activities of the Chinese customers (Bénassy-Quéré et al., 2014; Goulard, 2020). European companies may benefit from China's reluctance to use products and services of the USA. Since China and the European Union are the target of the USA trade sanctions, there will be more cooperation between Yuan and Euro in the future (Forrest *et al.*, 2017; European External Action Service, 2019).

Table 4. *Stag hunt game* G_4

Player 1	Player 2	
	C	D
C	4, 4	1, 3
D	3, 1	2, 2

Note: ***C****= cooperate;* ***D****= non-cooperate*
Source: *Own study.*

3.3 Dollar-Euro Game

The Dollar-Euro game is similar to Harmony game G_5, considering the economic and political relations between the USA and Europe before the presidency of Trump. In the financial crisis of 2008, the USA supported Europe with financial contributions for different reasons based on its own benefits, because a strong euro can keep up the desire of the Europeans to purchase cars, airplanes, drugs, software, crops, other goods and services which the USA provides.

Table 5. *Harmony game* G_5

	Player 2	
Player 1	C	D
C	4, 4	3, 2
D	2, 3	1, 1

Note: ***C****= cooperate;* ***D****= non-cooperate*
Source: *Own study.*

America First Policy of Donald Trump is an important factor which has changed the Dollar-Yuan game. Since April 2018, the USA has started to exert a 25% tax on steel and a 10% tax on aluminum produced by the EU. Since then, the Trump administration threatened the EU to paying the new tax. For example, the European automotive industry was threatened by Trump (considering the tariff imposition in 2019). Trump administration also threatened to increase tariffs of French drinks and other European symbolic products. In May 2018, Trump decided to leave the Joint Comprehensive Plan of Action (JCPA). For this reason, European companies were faced with more sanctions by the USA government for trading with Iran. After that, several European companies decided to leave the Iran market, fearing that they could be sanctioned by the USA. For example, the French Total S.A. formally left its gas project in August 2018 and transferred it to CNPC Company. Finally, the USA and the EU separated from each other in Huawei's case and the Europeans decided to ignore the pressure of the USA for Huawei prohibition.

Today we see several rounds of tariffs increasing between the USA and China and can also see a new round of tariffs classification between the USA and EU. If the USA intensifies its hostility against the EU, the EU may have not the way but expanding its cooperation treaties with China. More cooperation may be regarded as

the European support of China in the Dollar-Yuan battle for global leadership. If the USA and China move toward more tension in terms of money devaluation, the Dollar-Yuan battlefield will be directed toward the Eurozone. The Eurozone will be converted into a battlefield and the fire of war will enrage the powerful financial weapon of Europe. After United Kingdom leaving EU, the EU faces a crisis of solidarity reduction among the remaining countries, in this economic crisis; expanding this fact euro favors Germany against other member countries of the EU.

In a study which shows the Europe's perspective in 2030, the combination of factors (such as the aging of population which will result in a considerable decrease of the existing labor force soon, the minor growth rate of productivity in Europe due to the shortage of investment in research, and the human capital erosion due to the elongation of unemployment) will cause a weaker growth of the Gross Domestic Product in Europe (Włodarczyk, 2014). We anticipate that the Eurozone will be entangled in fire of the currency war of those two countries in the future and will turn into their battlefield. For reference, Brazil was one of the 2011 financial crisis' losers, although the main loser will be the Eurozone in the total currency war between China and the USA.

4. The Impact of COVID-19 Pandemic on the Global Economy

The 2008 financial crisis, the oil wars and the attack on the country's oil facilities, and finally the Coronavirus pandemic drastically changed the global world equation as well as the forecast for the world's economic growth rate. The coronavirus pandemic is one of the biggest shocks of the current generation because it changed the daily economic activity of many nations on an unprecedented scale and the extent of about 210 countries and regions at the current times of peace. Perhaps even the most pessimistic economists did not think that one day a respiratory disease could affect the economies of countries at this level, dividing the world into years before and after the coronavirus pandemic. Reports from major international organizations and institutions, including the International Monetary Fund and the International Labor Organization, show a steady decline in the global economic growth since the outbreak of the coronavirus pandemic.

The most important priority of all countries is to try to prevent the spread of COVID-19 pandemic and control it as soon as possible. To overcome this unbalanced epidemic, the international community must strengthen its solidarity. The hyper-rational thinking also suggests that countries and international societies cooperate with others based on their hyper-preferences in the situation of the COVID-19 pandemic and consider the collective benefit (Askari *et al.*, 2019; Askari and Eshaghi Gordji, 2020). Considering this concept, each hyper-rational decision-maker has three sets of choices: (1) set of individual preferences, (2) set of preferences for others, (3) both classes at the same time. In the Stag hunt game G_4, based on the concept of hyper-rationality, if the interaction between players is based

on collective benefit thinking then, for both players, cooperation C is a strictly dominant action, and (C, C) is preferred to (D, D) by the two players. Indeed, we need that the decision-makers, in addition to personal profit and loss, consider the profit and the loss of others and then choose their strategy to continue. So the members of the G7 and G20 must continue to promote monetary and fiscal policy cooperation. If the relations between the countries are modeled during the coronavirus pandemic crisis using the Threat game, what strategy will be chosen by countries?

5. Discussion and Conclusion

In this article, the difference between the currency war and trade war was outlined, being mentioned their effects on the global economy. For this purpose, we analyzed trade relations between the USA and China, China and Europe and the USA and Europe, supported by game theory. In the Dollar-Yuan game, strategies of each player include accusation, protectionism and negotiation, and devaluation of money. The threat game has a logical equilibrium (B, B) , because if both players use the credible-deterrent threat, they have pulled the brake of preventing the catastrophic consequences which are in the strictly-credible threat. The loss of executing a strictly-credible threat is higher than that of the credible-deterrent threat.

In the Dollar-Yuan game, strategies of each player include accusation, protectionism and negotiation, and devaluation of money. Protectionism ends in a trade war and money devaluation ends in a currency war. We show that the trade war and negotiation are a brake for preventing the currency war because the consequences of the trade war and its spread speed will be much lower than those of the currency war. Besides, in the trade war, only two countries are involved and other countries may benefit from that but in the currency war, competitive devaluation of money spreads everywhere like dominoes and its result will make the global economy depressed. In other words, the trade war is a sort of hostility between two countries but the currency war will raise the alarm for the whole economy of the world. When a country weakens its currency to devaluate its debts or reinforce exports compared to other countries, it can be said that the country has entered a total currency war with the world because it not only impoverishes the neighboring countries but also gets better results in exports with its trade partners.

We assume the global economy as a greenwood, the currency devaluation is like a spark of fire in this forest, the result of the spread of wildfire is eventually incineration of the forest or a global economic depression. Spark of fire may be deliberate or unintentional and aims to gain access to the fertile lands. National currency devaluation aims to achieve more exports. A state's exports can be considered the fertile land. Competitive devaluation of the national currency by the states against each other is like blowing the fire. If the fire is spread, the growing saplings and strong trees will burn altogether and even some animal and plant

species are killed completely. In currency war fire, some newly emerging economies which are the growing saplings will be damaged more but when the fire of currency war spreads, the developed economies as strong trees will catch fire as well. When the currency is devalued, reactive capital flight is recognized. Capital is like the living animals entrapped in fire seeking to find safe shelters to escape from danger.

At the end, when the fire is put out, a burnt forest will remain and it takes several years to flourish. The catastrophic results of the total currency war for all countries in the world can be clearly understood. As a result, it can be said that the currency war is like the spread of fire in the forest but trade war is like deforestation. In both cases, the forest is damaged but it differs depending on the type of damage, volume, and extent of damages. In other words, the global economy is depressed in the currency war but global economic growth becomes slow in the trade war.

The policymakers politically make advantage of the currency devaluation by promising to increase exports, production and new jobs, to cause deviation of difficult and problematic economic issues of the local societies. The competitive devaluation of money causes instability of the system and no one can derive a benefit from it and will lead to an increase in production costs, mutual money devaluation of other countries, tariff classification, imposing commercial limitations and finally the global recession. The recent trade tensions are not only related to bilateral trade deficit but also related to technology superiority as much as with the issues related to immigration. Weak investment is recognized as one of the distinctive consequences of trade tensions.

Therefore, to prevent the expansion of currency conflicts, there should exist a powerful collective leadership. The G20 commitment is a good start for preventing the targeting for the currency rate for competitive purposes, although punitive policies should be used for the wrongdoers beside them. Also, advanced economies should avoid direct action of exchange intervention in case of the global recession, providing that their trade partners don't change their currency rate. For this reason, it can be said that the world needs a new global monetary system between Dollar, Yuan, Euro, and also that other countries should connect their currencies with one of these currencies. Besides, the possibility of international competition among all countries should be taken into account. Once the monetary system and currency reserves are multipolar, states will more likely tend to have protectionism instead of a competitive devaluation of money.

Due to the Nash equilibrium of the threat, the United States and China can move toward a trade agreement and choose the dominant strategy. Europe and the United States are moving towards more trade and political tensions. Given the trade tensions between Europe and the United States, it is likely that China-European trade relations will be strengthened and closer to each other.

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